WORKSHOP SERVICE MANUAL

CONTENTS

B. General specifications

Engine

Characteristic	8110	8120	8130	8140	8150	8160
MF manufactured by VALMET	-	-	-	620 DS	620 DS	634 DS
PERKINS model	1006.6THR2	1006.6THR3	1006.6THR4	-	-	-
Number of cylinders	6	6	6	6	6	6
Turbocharger	yes	yes	yes	yes	yes	yes
Bore (mm)	100	100	100	108	108	108
Stroke (mm)	127	127	127	120	120	134
Cubic capacity (cm^3)	6000	6000	6000	6600	6600	7400
Maximum power DIN (KW)	99.3	106.6	114	117.7	132,4	147,1
P.T.O. power (KW)	88.3	97	103	106.6	117,6	132.3
At engine speed of rev/min	2200	2200	2200	2200	2200	2200
Maximum torque (Nm)	551	588	625	650	720	810
Engine speed at maximum torque (rev/min)	1400	1400	1400	1300	1400	1300
Idling speed (rev/min)	1000	1000	1000	1000	1000	1000
Torque at rated speed (Nm)	430	462	495	555	555	620
Maximum no load speed (rev/min)	2310	2310	2310	2370	2370	2370
Permissible front P.T.O. (KW)						
at 2200 rev/min	75	75	75		92,1	
Maximum torque (Nm)	328	328	328		400	
Lubrication	Gear type pump-strainer on suction and external canister type filters					
Valves	Overhead, push-rod operated					
Valve clearances (cold)						
- Inlet (mm-in)	0,20 / 0,08	0,20 / 0,08	0,20 / 0,08	0,35 / 0,012	0,35 / 0,012	0,35 / 0,012
- Exhaust (mm-in)	0,45 / 0,018	0,45 / 0,018	0,45 / 0,018	0,35 / 0,012	0,35 / 0,012	0,35 / 0,012
Engine oil cooler	yes	yes	yes	yes	yes	yes

Fuel system and air cleaner

Supply pump	AC DELCO	Bosch in line
Fuel filter	Yes	
Number of elements	2	
Fuel injection pump	Stanadyne	Bosch in line
Injectors and nozzle holders	Stanadyne	
Cold weather starting	Thermostart	
Air cleaner : Two stage, dry element with blockage indicator. Built-in centrifugal pre-filter, self-cleaning by exhaust extraction of dust		

C. Viscostatic fan

Description

Engines in the 8100 series are fitted with a cooling fan equipped with a viscocoupler of the Eaton trademark. This device allows power increases in the region of between 2 and 3 hp.

The viscocoupler is made up of three main parts:

- the driving section which is powered by the engine and consists of a shaft **(1)** integral with a plate **(2)** which has annular grooves,
- the driven section comprising a hub **(6)** fitted with the fan and body **(7)** which also has annular grooves,
- the regulating section comprising a thermostatic spring **(3)** operating the valve **(4)**.

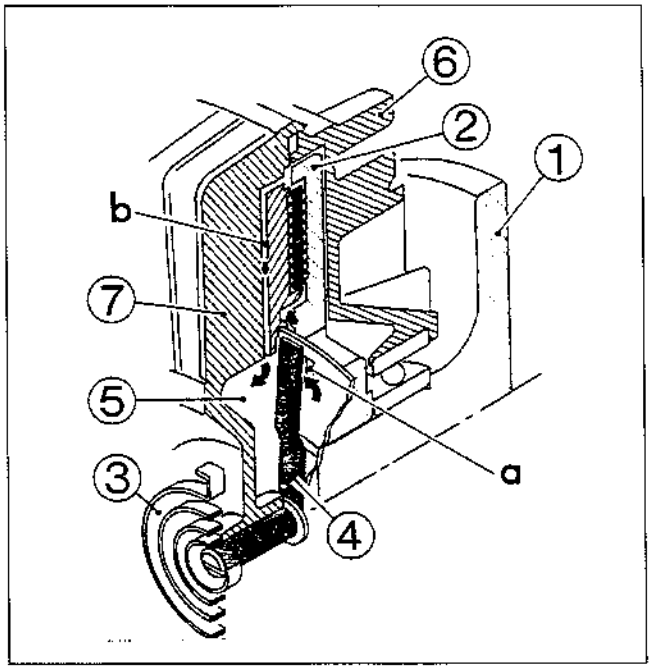
The centre of the device is fitted with a reservoir **(5)** filled with a viscous silicon fluid.

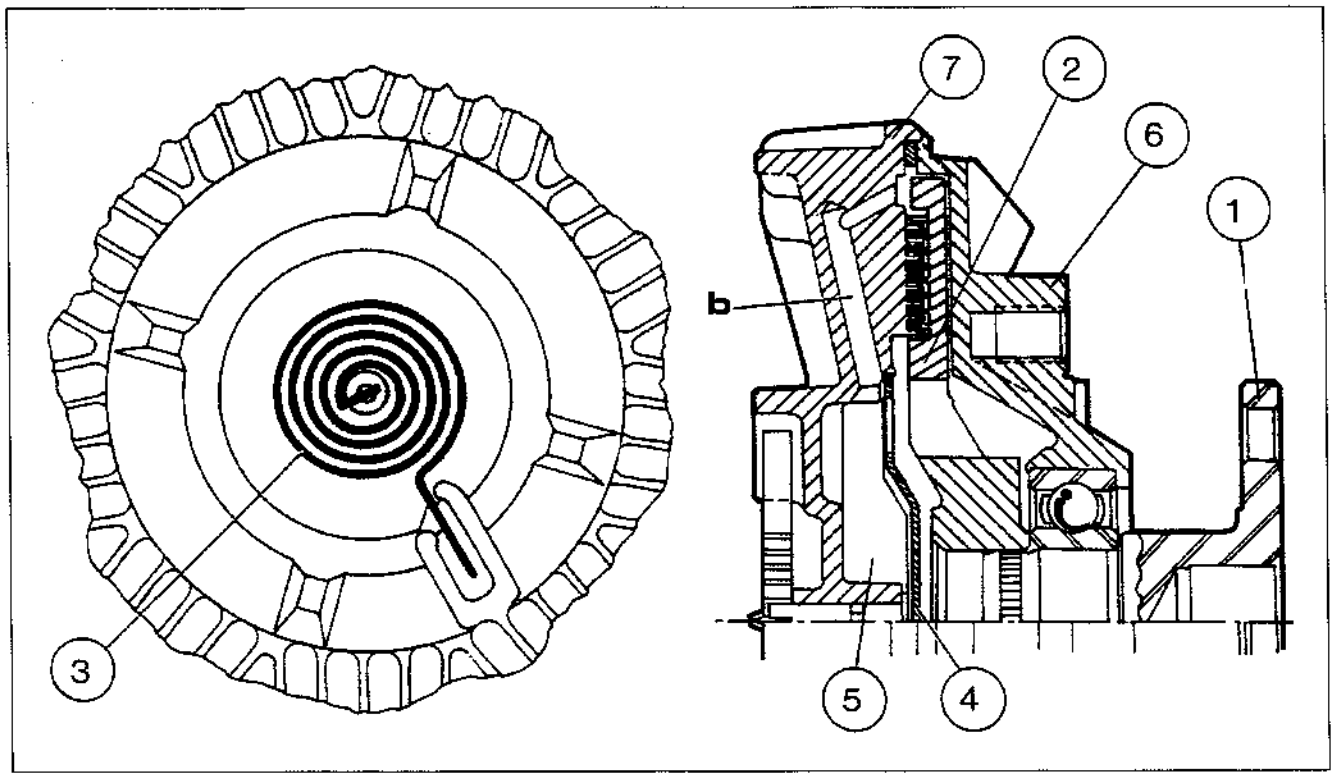
Operation

When the temperature of the air crossing the radiator reaches a preset value, the thermostatic spring **(3)** acts on the valve **(4)** which opens orifice **a**. The liquid is driven towards the annular grooves on the hub **(2)** and body **(7)** by centrifugal force. Torque is transmitted by the internal friction of the highly viscous fluid and its adhesion to the walls. The fan is then driven to provide more efficient air cooling.

The fan speed varies continuously over the whole control range depending on the temperature.

When the temperature of the air going through the radiator decreases, the spring closes the valve and prevents the fluid from coming into contact with the friction area. The fluid gradually returns to the reservoir **(5)** via pipe **b** and the fan is disengaged, leaving only a slight resistive torque.





Gearbox - *Input unit*

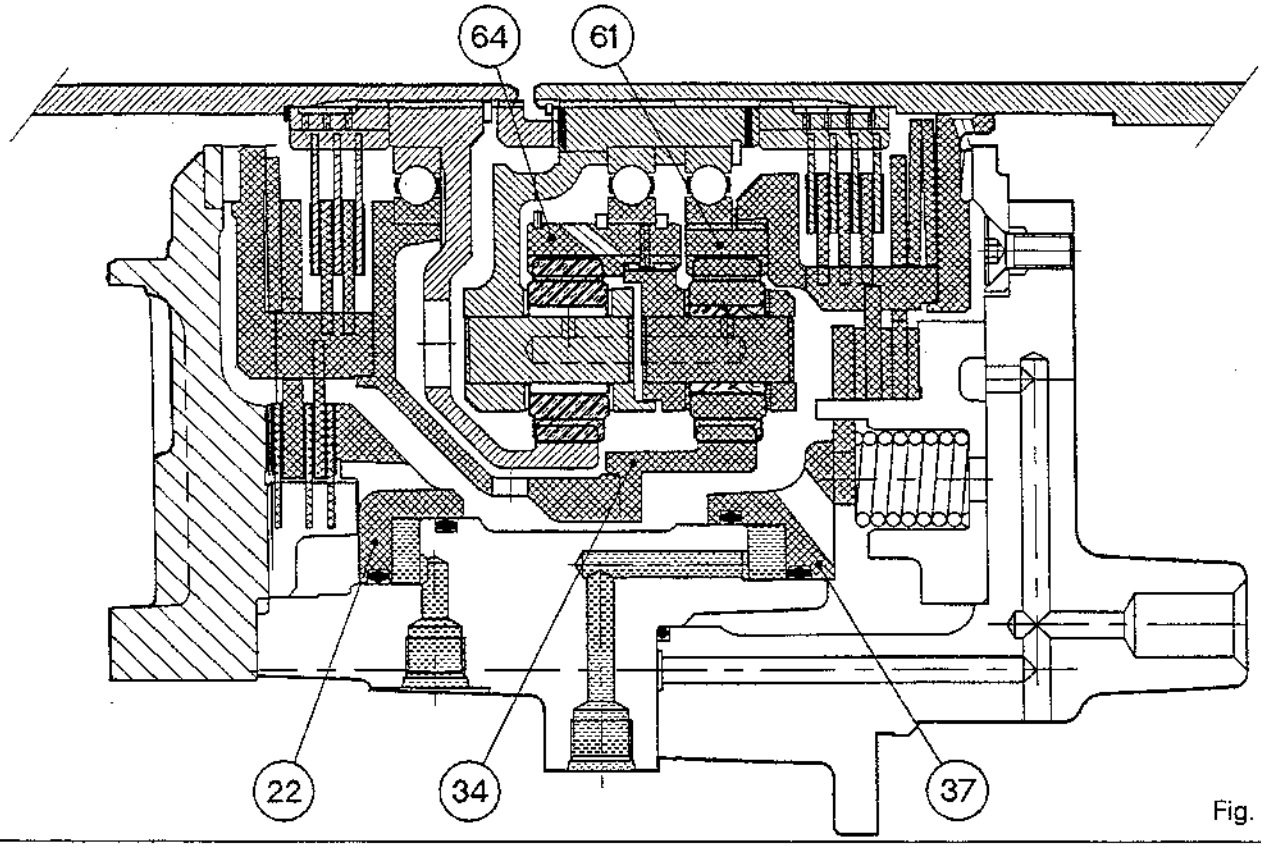


Fig. 3

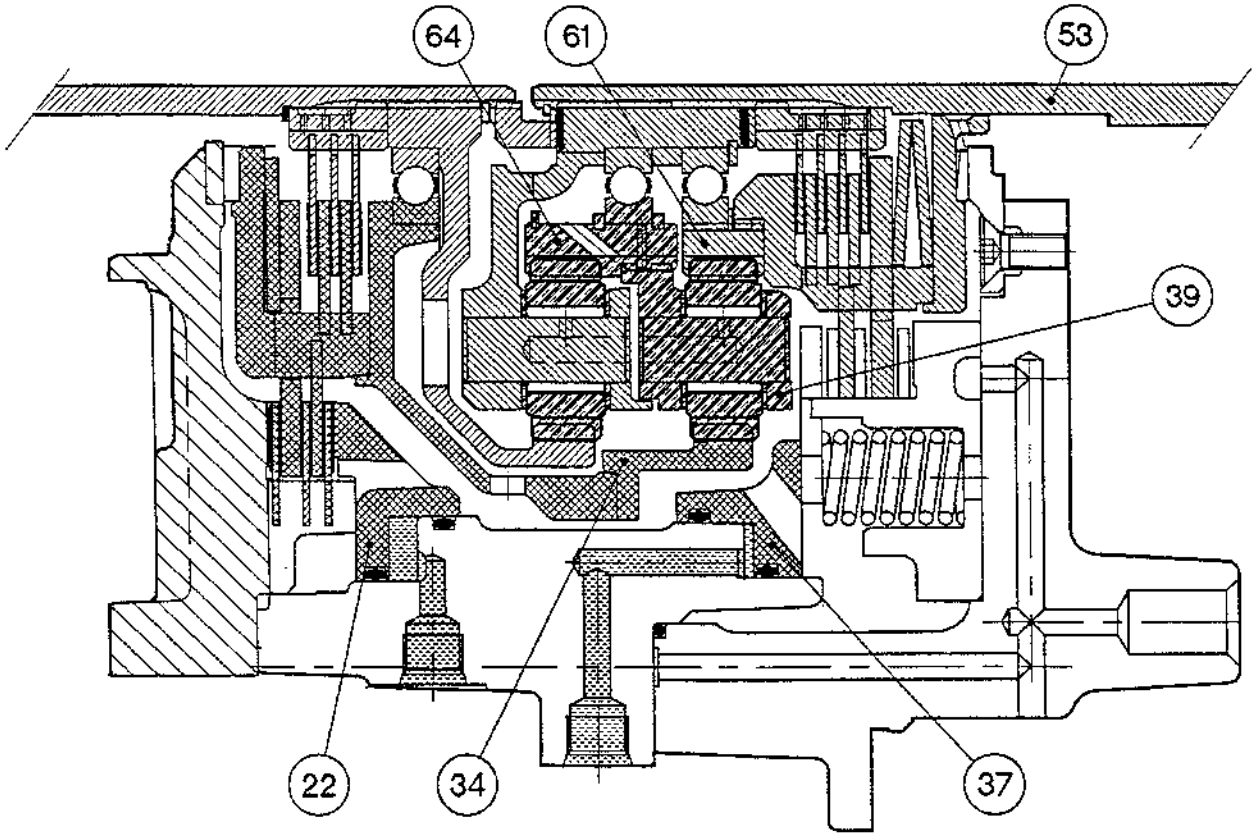


Fig. 4

C . Adjusting the forks and selector

Principle

The correct positioning of the forks **(60)**, **(61)** and the selector **(63)** is obtained on the basis of difference between the distances between the tapped holes **Y** and the contact areas **Z** on selector rails **(56)** and **(57)**.
The forks and the selector can be displaced by acting on the front or rear bolts **(62)**, according to the adjustment required.

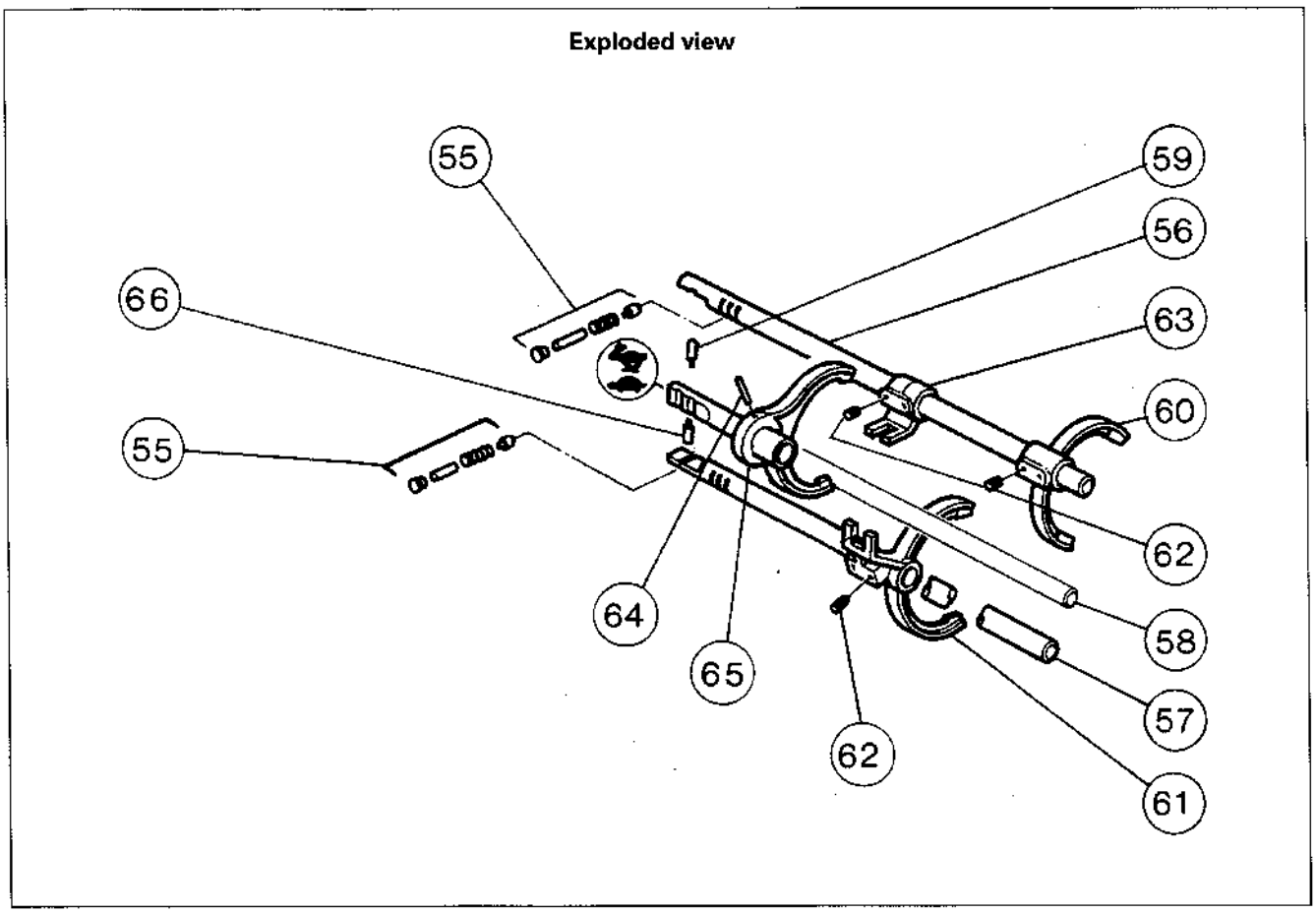
Gearboxes are equipped with GT synchros. The forks are adjusted with the gear engaged.

8. Coat the plugs of the indicating assemblies **(55)** with Loctite 542 and screw them in. Lock the fork **(60)** first. Keep the synchro ring resting on the gear. Check that the rear pads of the fork are not in contact with the synchro ring.
9. Repeat the operation (fork locked in 2nd gear), checking that the front pads are not in contact with the synchro ring. If they are, adjust the fork by adjusting bolts **(62)** coated with Loctite 221.
10. Proceed in the same manner to adjust fork **(61)**.
11. Adjust the selector **(63)** in line with the notch of the selector of fork **(61)**.
    Adjust the Hare/Tortoise selector **(92)** (see section 5C01).

D . Final operations

12. Reinstall the selector cover (see section 5 C01).
13. Recouple the tractor between the gearbox and the rear axle (see section 2 C01).
14. Carry out road test. Check :
    - that the gears can be engaged,
    - that the reverse shuttle operates correctly,
    - that the Hare/Tortoise range operates correctly.
15. Check for leaks on the mating surfaces between the gearbox and rear axle, on the selector cover and on hydraulic fittings.

Exploded view



Then drill out to a diameter of 12 mm and to the same depth.
Drive out the rivets with a suitable rivet punch (Fig. 16).

Removing and disassembling the driving pinion

88. Remove the right-hand cover (sections 9F01 or 9R01) and left-hand cover (sections 9F02 or 9R02).
89. Remove the bolt **(43)**, the washer **(44)**, the gear **(45)**, the bolts **(37)**, the backing plate **(36)** and the shims **[35]**.
90. Remove the bearing cup **(34)** and the driving pinion equipped with bearing cones **(31)** and **(33)**.
91. Extract the bearing cup **(30)** and cones **(31)** and **(33)**.

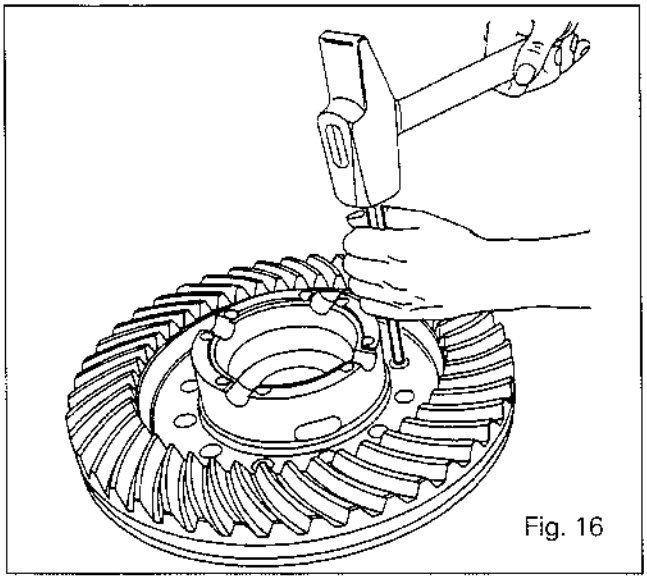


Fig. 16

G. Reassembling and refitting the driving pinion and crown wheel

Reassembling the driving pinion

92. Check the parts and replace any that are faulty.
93. Using a press and a suitable fixture, fit the bearing cones **(33)** and **(31)** fully home against the shoulder on the driving pinion.

Refitting the driving pinion

94. Apply Loctite 603 on the outside diameter of the bearing cup **(30)** and fit it fully home against the shoulder in the housing.
Note: The bearing cones and cups must be cleaned and lubricated before fitting.
95. Fit the driving pinion and the bearing cup **(34)**.
96. Screw two guide studs onto the housing.
97. Check the torque on the driving pinion.
The principle consists in removing or adding shims **[35]** in order to obtain a rotating torque of 1.80 to 3.80 Nm, measured with a dynamometer and a suitable splined sleeve, ref. 1626464M3.
Each time the bolts **(37)** are reinstalled, the torque of 85 to 130 Nm must be complied with. On final refitting, apply Loctite 270 on the bolts **(37)** and tighten them to a torque of 85 to 130 Nm.
Fit the gear **(45)** and the washer **(44)**. Tighten the bolt **(43)** to a torque of 91 to 122 Nm - Loctite 241.

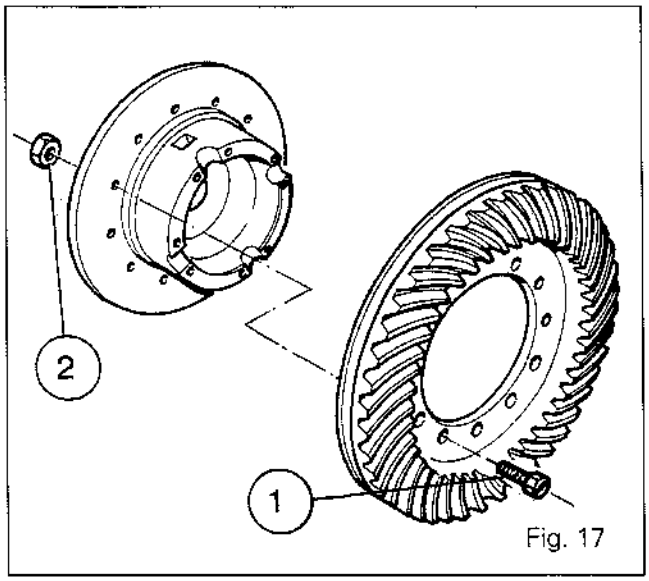


Fig. 17

Refitting the crown wheel

98. Clean the mating faces on the new crown wheel **(18)** and on the housing **(17)**, the bolts and the nuts specified in the spare parts catalogue.
99. Apply Loctite 270 on the leading threads of bolts **(1)** and position them in the crown wheel and the housing (Fig. 17).
100. Tighten and lock the nuts **(2)** (Fig. 17) to a torque of 150 to 160 Nm.

B. Refitting of ring gear, sun gear, planetary carrier

17. Assemble the ring gear **(44)** on the ring gear carrier **(42)** with rings **(24) (26)** ensuring that they are properly engaged in their grooves.
18. Fit the the wheel hub **(22)** and the ring gear carrier **(42)** assembly equipped with the ring gear. Repeat the operations 38 and 39.
19. Manually check rotation of the wheel hub **(22)**
20. Install and tighten nut **(27)** coated with Loctite 270 (400 - 450 Nm).
21. Lock the nut by bending its lock tab into the slot.
22. Fit sun gear **(28)** and circlip **(29)**.
23. Coat the joint face of the planetary carrier with a sealing compound (Loctite 510 or equivalent).
24. Check that the thrust washer **(30)** is present.
25. Refit the planetary carrier.
26. Fit the bolts **(33)** and torque them to:
    - 70 - 85 Nm (AG 155)
    - 40 - 60 Nm (AG 200)
27. Turn the wheel hub to place the filler plug in a horizontal position. Top up the oil level of the final drive unit. Refit the plug **(21)** with its seal **(20)**.
28. Refit the wheel. Remove the props and the trolley jack. Tighten nuts to torques:
    - 800 - 850 Nm up to serial number D 152 009,
    - 640 - 680 Nm from serial number D 152 010.
29. Remove the shims and release the handbrake.
30. Carry out a road test of front axle. Check the sealing of the joint face of the planetary carrier and of the filler plug.

C. Disassembly of wheel hub

31. Remove the planetary carrier. carry out operations 1 to 6.
32. Remove the circlip **(29)** and the sun gear **(28)**.
33. To avoid damaging the swivel housing **(47)** thread, it is recommended to unlock and unscrew the nut **(27)** using the socket 3378 028 M1 (Fig.1).
34. Sling the wheel hub (22). Remove the hub and the ring gear carrier **(42)** then the ring gear **(44)** using puller 3378 038 M1 (Fig.3) and the sleeve used for this type of front axle.
    Note: Coat puller cone and screw with graphite grease.
35. If necessary, extract the bearing cones **(18)** and **(25)**. Disassemble the bearing cups **(19) (23)**.

9A01.2

Hydraulics - Closed Centre

A. General

The new hydraulic circuit for 8100 tractors is a closed centre with controlled flowrate and pressure. It is made up of two separate HP and LP circuits supplied by a variable displacement pump which is, itself, supplied by a booster pump.
Both pumps are driven by the external teeth on the PTO clutch.
The booster pump installed on the left-hand cover sucks the oil, through a strainer, into the common reservoir formed by the centre housing and the gearbox. The booster flow is then conveyed to the right-hand cover and passes through the main filter before flowing to the variable displacement pump, and to the cooling and gearbox lubricating circuit. The booster pressure is maintained by a valve mounted on the right-hand cover and calibrated at 5 bars.

The variable displacement pump provides supply to either one or two override units installed on the left-hand cover, as applicable:
- one unit for tractors without trailer braking,
- two units for tractors with trailer braking.

The first override unit ensures supply to:
- the steering system (or the steering system and trailer braking) as first priority,
- the 17-bar circuit as second priority.

The second override unit, if fitted, shares its first priority between the steering system and the trailer brake circuit. When supply has been provided for these priority functions, the remaining flow is available for the auxiliary spool valves and the lift control valve.
It is impossible for the whole output from the variable displacement pump to be absorbed by the override units.
All the pilot signals from the various HP valves are sent to the override units and then transmitted to the variable displacement pump controller.

The controller responds to the pilot signal corresponding to the function requiring the highest pressure.

Characteristics of components

Suction strainer (16)
- Cartridge type
- Filtration threshold: 150 µ

Booster pump (14)
Trademark: Rexroth
Capacity: 60 cm³ per revolution
Output: 160 litres/mn at 2,200 rpm

Main filter (34)
- Filtration threshold: 15 µ
- With bypass
- With differential pressure switch

Safety valve (40)
- Calibration: 5 bars
- Directly connected to housing

5-bar switch (K)
- Opening at 3 bars - Closing at 2 bars
- Fitted in parallel with the filter
- Connected to the indicator light on the dashboard

Variable displacement pump (12)
- Trademark: Brueninghaus
- Type: Axial pistons (9)
- Capacity: variable from 0 to 45 cm³ per revolution
- Output: 0 to 110 litres/mn at 2,200 rpm
- Pressure: 22 bars min.
  200 bars max.
- Lubrication: internal, with return to housing

B. Principle

The principle of the closed centre hydraulic system is to limit the power absorbed by the engine. If no hydraulic slave device is actuated, no output is discharged from the variable displacement pump. When one function is engaged, the pump supplies only the output required for that function.

Note: When the housing is drained, the high-pressure filter is replaced or any servicing operation resulting in the intake of air is performed on the circuit, the hydraulic circuit must be primed. Disconnect the electrical stop device on the injection pump and turn the engine with the starter motor until the 5-bar pressure indicator light goes out on the dashboard.

CONTENTS

B. Checking the pressure of Dynashift pistons (Fig. 8)

1. Remove the guard preventing access to the connectors (30 kph tractors).
2. Remove plugs **(1)** from the distribution unit.
3. Screw in two male connectors **(2)** and **(3)**, ref. 3384387M1, and connect them to the couplers, ref. 3582045M1, fitted onto pressure gauges with a capacity of about 30 bar.
4. Start the engine.
5. Operate the lever under the steering wheel to select each ratio (A, B, C and D).
6. Check that the pressures are correct, using the following table :

Ratio	Front piston connector **(2)**	Rear piston connector **(3)**
A	17 bar	17 bar
B	17 bar	0
C	0	17 bar
D	0	0

7. If the pressures are not correct, check the movement of the spool of the solenoid valves, refer to the electrical tests.
8. Refit the guard and seal the fixing bolt with lead.

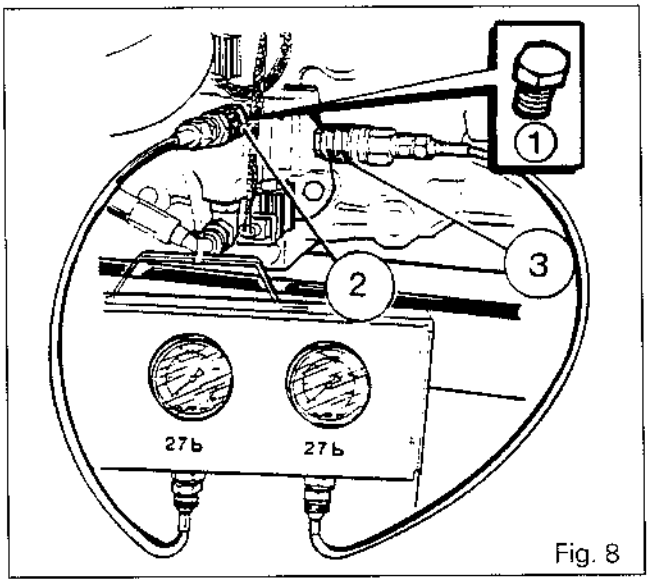


Fig. 8

9M01.2

Hydraulics - Open centre

General

8100 series tractors can be equipped with a trailer braking system consisting of:
- a valve assembly (spool valve) fitted on the right-hand hydraulic cover,
- a pipe linking the spool valve to a connector located at the rear of the tractor,
- a pipe connected to the master cylinders and linked to the pilot flow housing of the valve.

The valve receives priority supply from the high-pressure circuit. The oil not used for trailer braking is sent to the auxiliary spool valves.
The valve controls the flow and pressure towards the trailer brakes. It is actuated by the pressure of the tractor braking circuit so as to obtain gradual tractor/trailer braking that is proportional to the effort applied on the pedal. The trailer brake only works if both pedals are coupled.

Description of the trailer braking valve (Fig. 1)

Flow control valve (1)
This valve controls flow Qx and regulates the hydraulic flow transmitting the pressure to the trailer brakes (see pages 3 and 5).

Control spool assembly (2)
This actuates the flow control valve and regulates the trailer braking pressure.

Non-return valve (3)
This valve stops oil flowing back from brake line **B** to port **N** (see pages 3 and 5).

Pressure relief valve (4)
With loaded springs **(8)**
This limits the brake pressure.

Pilot flow housing (5)
With piston **(6)** and bleed screw **(7)**.
This controls the trailer brake valve via a sensing line from the tractor braking system.

Designation of ports (see page 5)

B Supply to the trailer brake connection
N Continuation to the auxiliary spool valve
P Pressure
R Return to housing
Y Supply from the tractor braking system

A. Operation, trailer brakes released and partial trailer braking

Trailer brakes released (Fig. 2)

There is no pressure in sensing line **Y** (no effort applied on pedals).

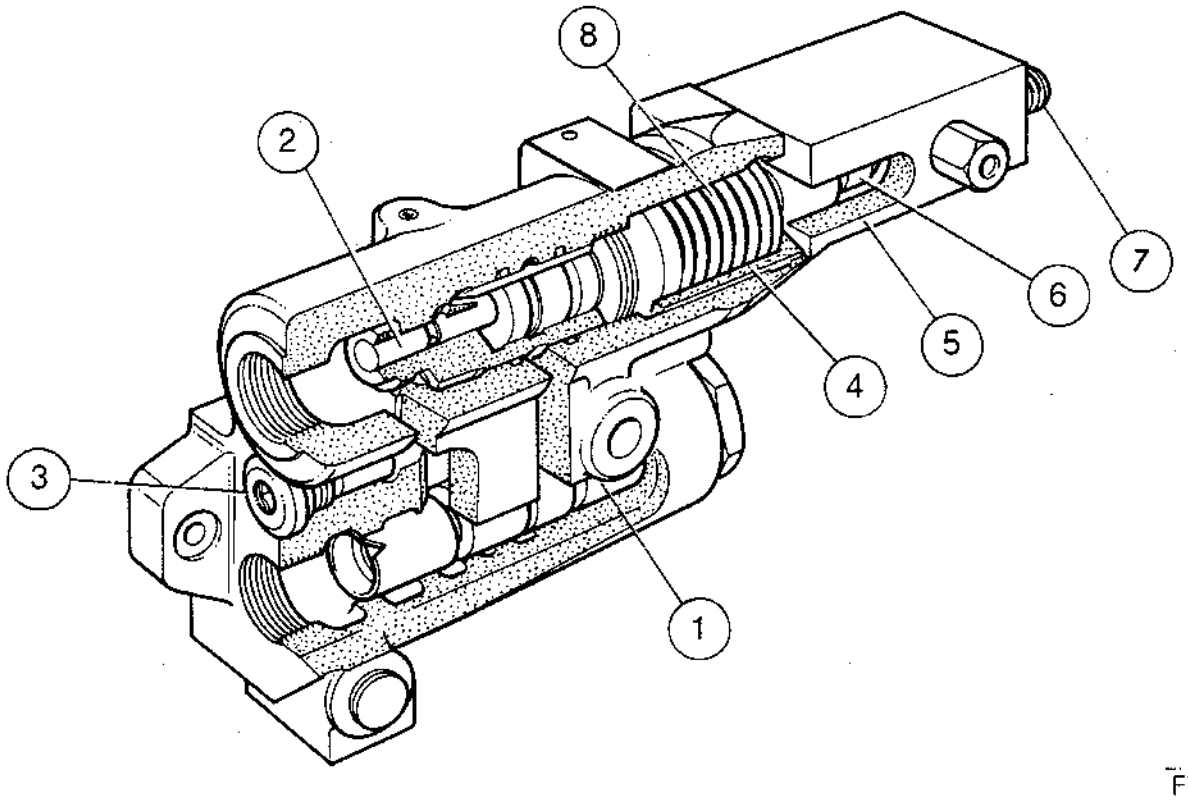


Fig. 1

CONTENTS

A. Principle of «Load Sensing»

Steering unit

Unlike the classic unit, the LS steering unit is equipped with a fifth LS port (Fig. 8).
This port is either connected to the Orbitrol closed circuit when the steering is in the neutral position or connected with the supply pressure line when the steering wheel is turned.

Divider valve (Fig. 1 and Fig. 8)

The divider valve fitted in a cartridge on the right-hand lateral cover is equipped with four ports:
- **P** connection with the pump,
- **DC** connection with port **DC** on the steering unit,
- **DE** connection with the trailer brake supply,
- **LS** control of connection with the **LS** port of the steering unit.

Operation of «Load Sensing»

The divider valve (Fig. 1) comprises a slide which is balanced under the effect of:
- the **LS** control pressure + a spring (equivalent to a pressure of 10 bar),
- **DC** supply pressure from the steering unit acting on the opposite side of the slide valve from the spring.

The divider valve, as its name indicates, divides the flow from the pump into two directions: one directed to port **DC** of the steering unit and the other (**DE**) directed to the trailer brake and the auxiliary distribution valves, according to the position of the slide valve.

This division is governed only by the operation of the steering and the **LS** control signal.

When the steering system is not being used (steering in the neutral position), the oil from the **DC** channel joins the Orbitrol closed centre circuit, with no pressure towards port **LS**. The action of the spring, equivalent to 10 bar, is applied on one side of the slide valve. The pressure in channel **DC** and in the axial hole in the slide valve forces it to move against the spring (Fig. 1).

If there is no pressure in line **DE**, the slide valve is positioned so as to slightly close the passage to **DE** and create a 10-bar decrease in pressure from **P** to **DE**.

If, however, there is pressure in line **DE**, such as when the auxiliary distribution valves are used, for example, the slide valve is moved to the right, fully opening the passage towards the trailer brake.

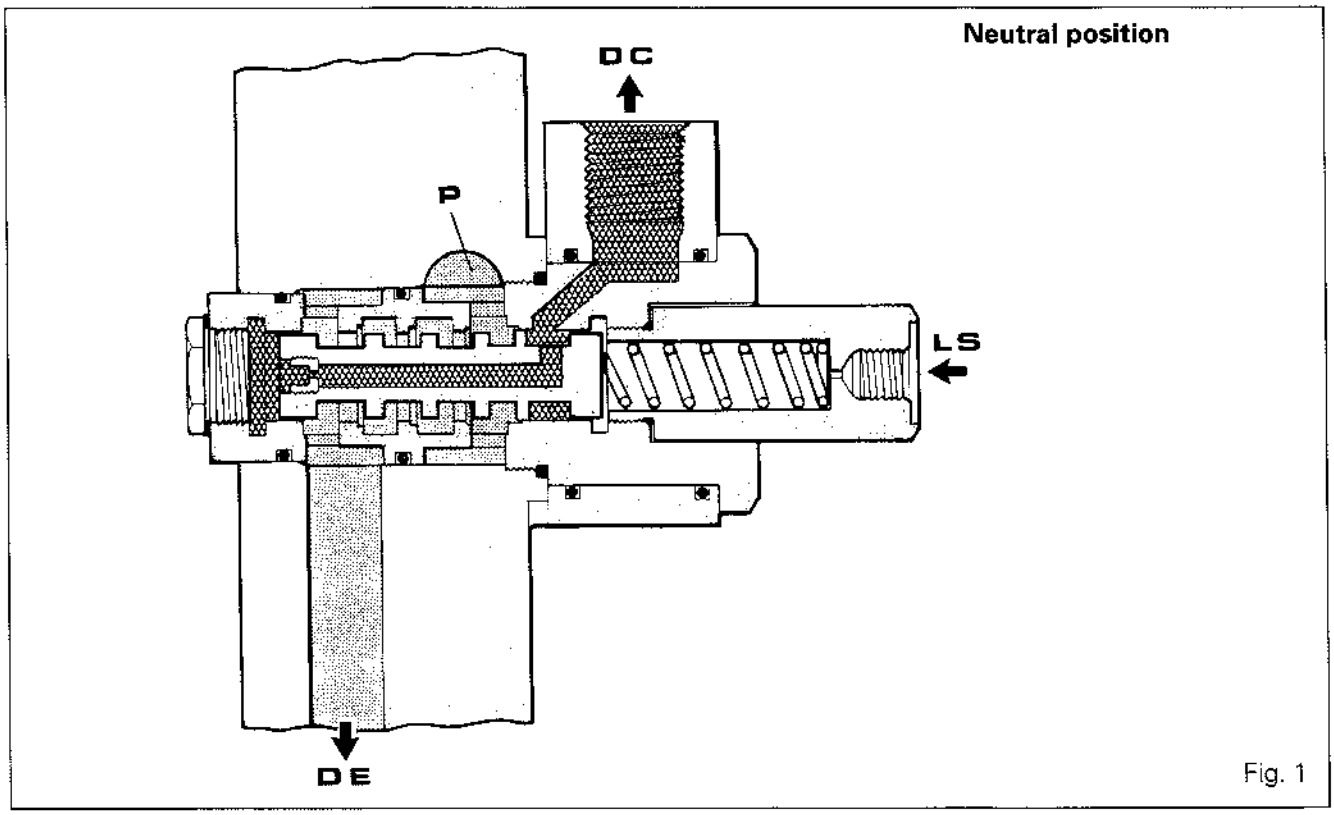


Fig. 1

High-flow circuit

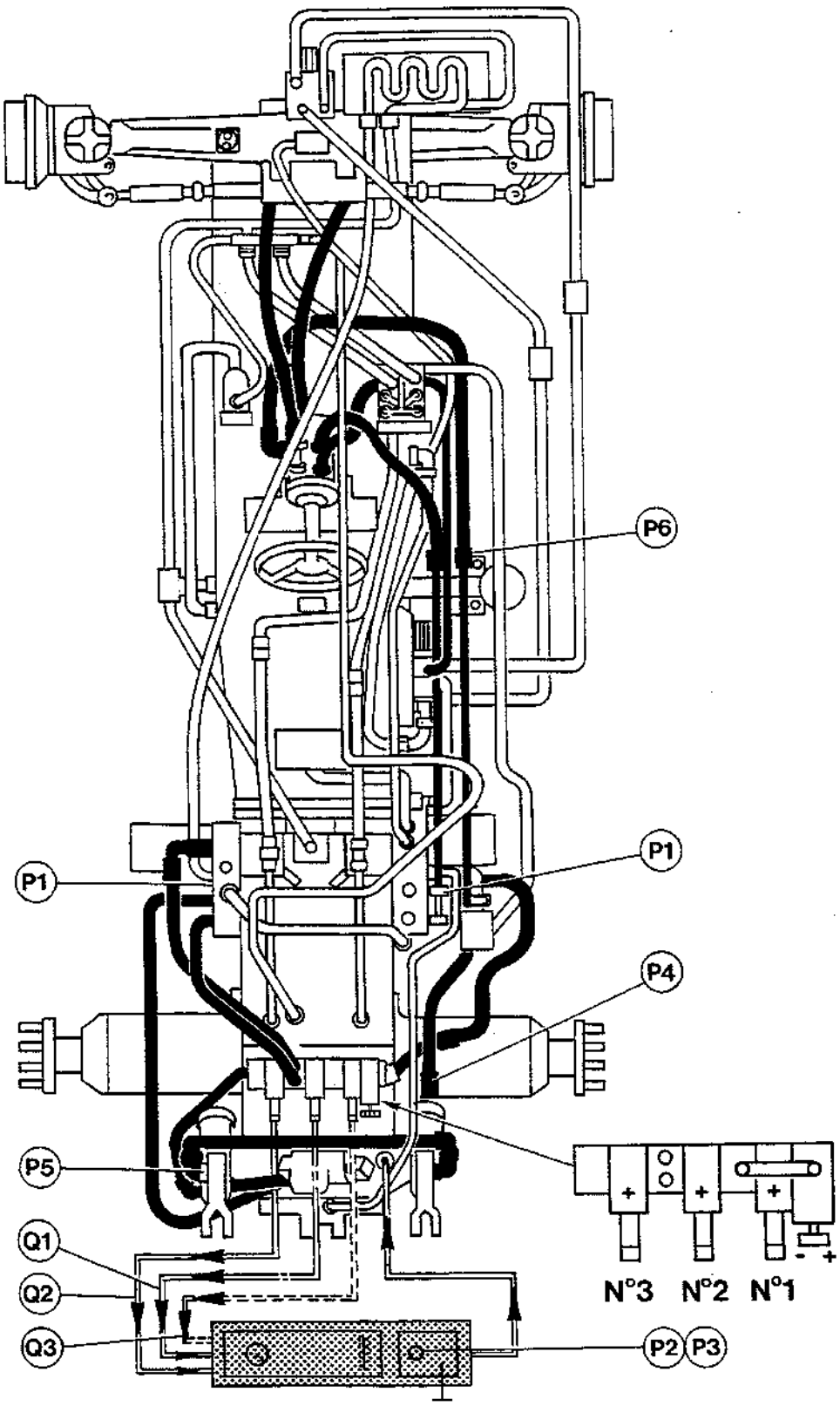


Fig. 2

Tester-programmer - Description

A. General - Description

Note : These sections concern the use of the tester-programmer on all tractors in series 6100 and 8100.

The following testers should be used according to the local language and speed limits:

- 3376941 30 km/h French
- 3376942 40 km/h French
- 3376943 30 km/h English
- 3376944 40 km/h English
- 3376945 30 km/h German
- 3376946 40 km/h German
- 3376947 30 km/h Spanish
- 3376948 40 km/h Spanish

The tester-programmer allows you to:

- display the operation of the main electronic components and detect failures of the following systems:
  . Autotronic,
  . Electronic lift control,
  . Datatronic.
- set the parameters of the various electronic components according to the characteristics of the tractor concerned.

Autotronic

It is possible to:

- Load a new program into the AUTOTRONIC 2 electronic transmission control unit (ETCU) in order to update its programming.
- Set the parameters on a replacement AUTOTRONIC 2 unit before installing it on a tractor.
- Test the AUTOTRONIC 2 system.

Electronic lift control

It is possible to:

- Display the operation of the system and detect failures.
- Check the setting of the position sensor.

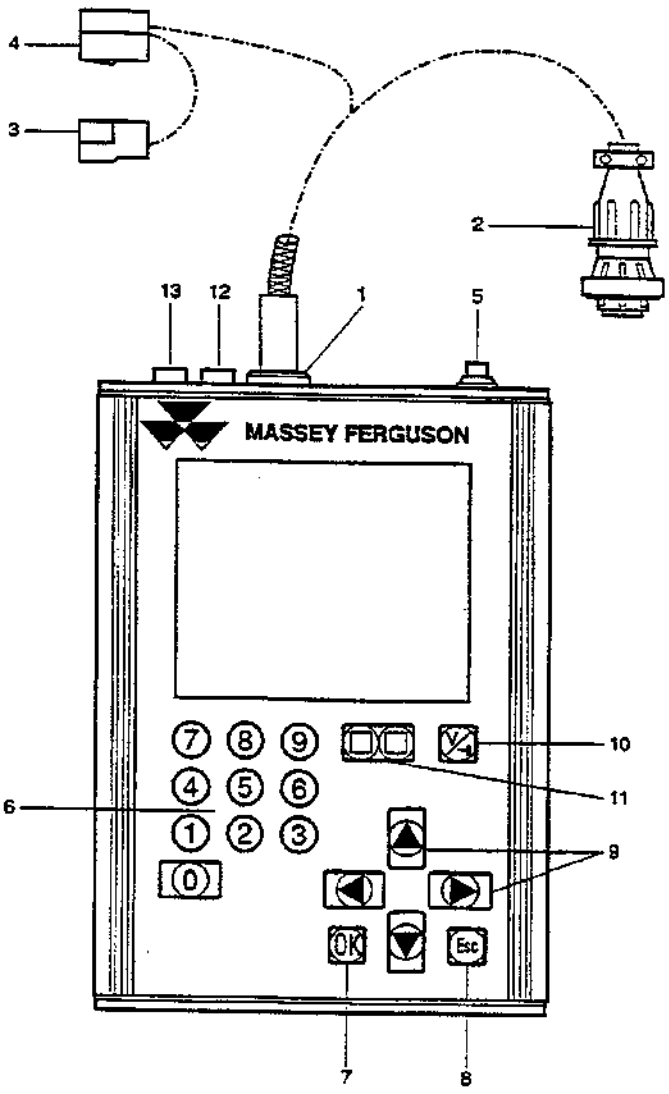
Datatronic

It is possible to:

- Configure the Datatronic system according to the specifications of the tractor it is installed on (in the same way as for the Autotronic system).
- Check the various values calculated by the Datatronic system.
- Display the menu in the desired language.

List of parts

1 - Cable harness/tester connector
2 - Connector for Autotronic unit (CAN)
3 and 4 - Power supply and earth terminals
5 - On/Off switch
6 to 10 - Keypad
11 - Screen display contrast adjustment
12 - Input for earth continuity test
13 - Input for testing of voltmeter and frequency-meter



CONTENTS

11B04.2

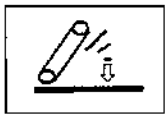
Electronics - Electronic lift control

A. General

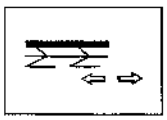
The tester is used to trace failures in the event of faulty operation of the lift linkage whether it is recognised by the diagnostic indicator light or not.
To carry out the test: START THE ENGINE.
The **monitoring** and **position sensor adjustment** functions are then accessible.

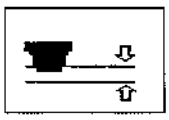
B . Symbols (icons)

As in the case of the Autotronic unit, the ELC functions are identified by the following icons:

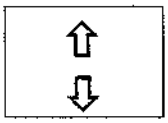

Lowering speed

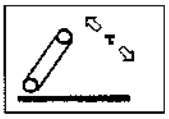

High position


Draft

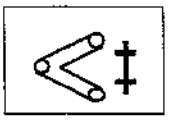

Position

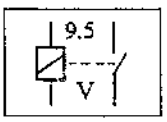

Intermix


Lifting Lowering

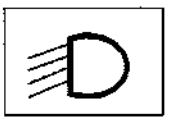

Damper

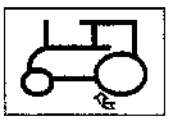

Fault

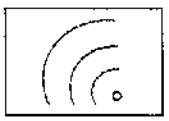

Depth



Relay


Lighting


Wheel slip


Radar

C . Connection (see 11 A01)

- Use connection No. 3 for tractors not equipped with Datatronic.
- Use connection No. 4 for tractors equipped with Datatronic.

D . Procedure

- Tracing a fault code

If more than one failure occurs at the same time, it may be difficult to visually decode the auto-diagnostic indicator light **I** on the console.
In these conditions, the «MONITORING» function can be used to identify the code or codes generated by the indicator light. The code is displayed in clear mode under the symbol corresponding to the auto-diagnostic indicator light.
Example:
Code 22 - Fault on position sensor


22

- Precise tracing of a fault

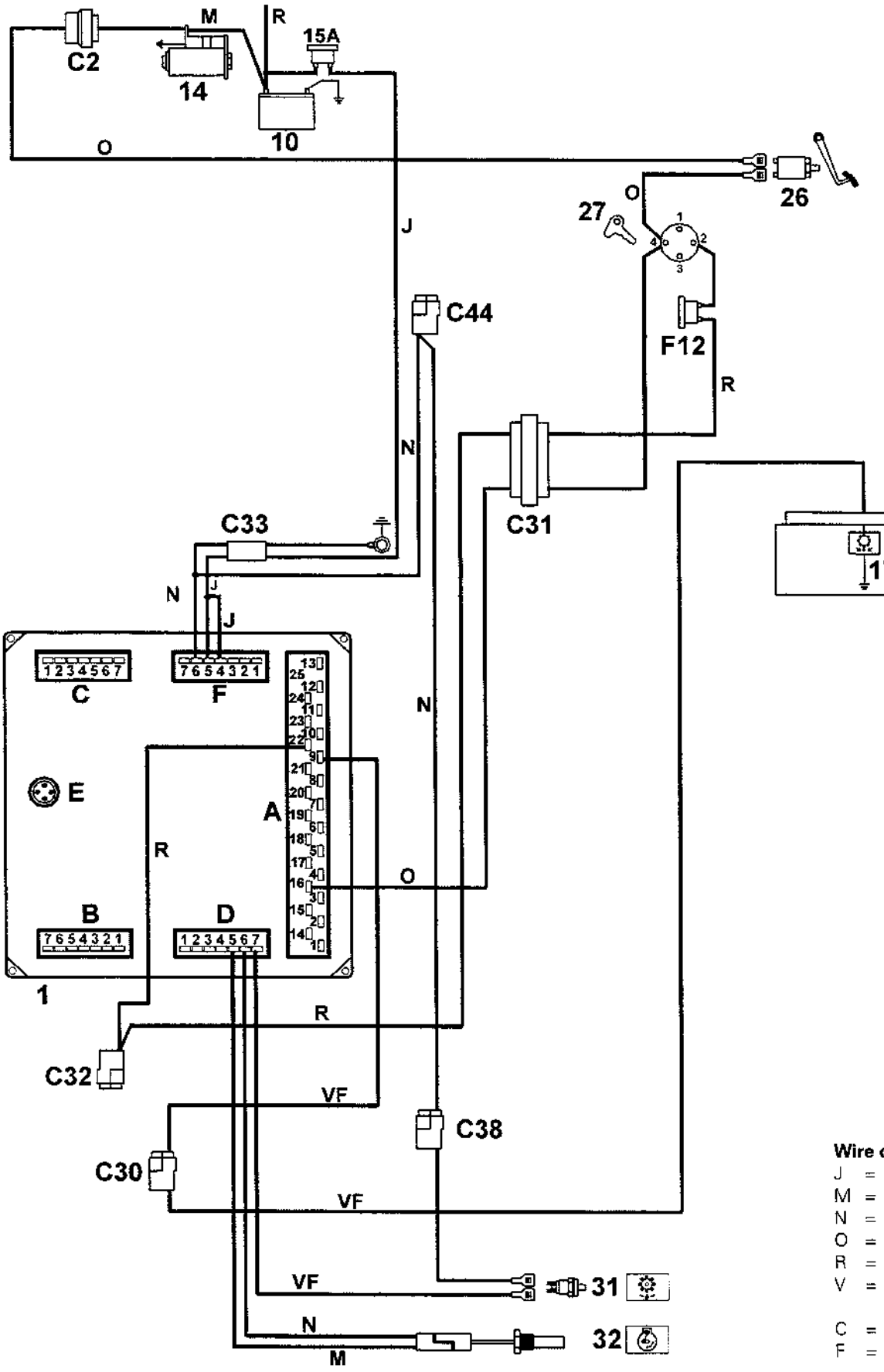
The code generated by the auto-diagnostic system has been translated and you want to carry out a precision check on a component, such as a potentiometer. The first monitoring screen allows you to view all the components of the console along with the corresponding values of the feedback signals.
The second screen is used to monitor all the analogue inputs: battery voltage, signals from effort and position sensors, state of the internal safety relay.
The third screen is dedicated to external controls and the fourth to frequency inputs, i.e.: engine speed, forward speed (radar), theoretical forward speed (sensor) and MAX wheel slip value.

- Adjusting the position sensor

If, during servicing, it is necessary to check the adjustment of the position sensor or to fit a replacement sensor, the tester proposes the following section: position sensor adjustment.
When this function is called, the tester indicates whether the position sensor is correctly adjusted or not and, if it is incorrectly adjusted, it indicates whether the adjustment value is to be decreased or increased.
In all cases, the message «OK» is displayed on the screen as soon as the sensor is correctly adjusted.

CONTENTS

Autotronic 2 - Checking with tester



Wire colour

J = Yellow
M = Brown
N = Black
O = Orange
R = Red
V = Green

C = Light
F = Dark